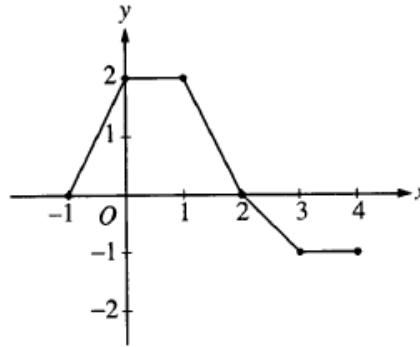


You will have 5-10 mins to look over your review and ask any questions - get ready to take your test! Turn your desks into rows please.

AP CALCULUS AB
Unit 8 Review
Applications of Integrals

No calculator may be used on the following problems.

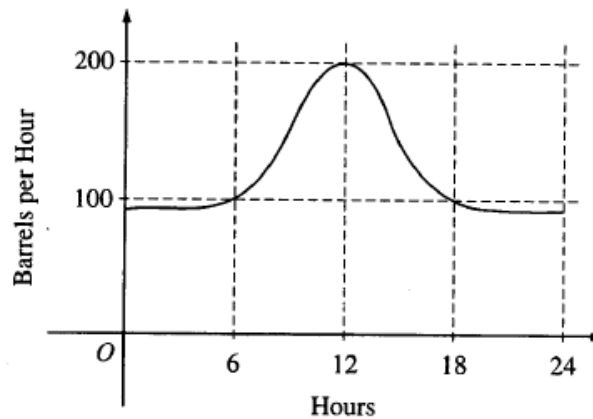
1.



The graph of a piecewise-linear function f , for $-1 \leq x \leq 4$, is shown above. What is the value of $\int_{-1}^4 f(x) dx$?

- (A) 1 (B) 2.5 (C) 4 (D) 5.5 (E) 8

2.



The flow of oil, in barrels per hour, through a pipeline on July 9 is given by the graph shown above. Of the following, which best approximates the total number of barrels of oil that passed through the pipeline that day?

- (A) 500 (B) 600 (C) 2,400 (D) 3,000 (E) 4,800

3. A particle moves along the x -axis so that its position at time t is given by $x(t) = t^2 - 6t + 5$. For what value of t is the velocity of the particle zero?
- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
4. A solid is generated when the region in the first quadrant enclosed by the graph of $y = (x^2 + 1)^3$, the line $x = 1$, the x -axis, and the y -axis is revolved about the x -axis. Its volume is found by evaluating which of the following integrals?
- (A) $\pi \int_1^8 (x^2 + 1)^3 dx$
- (B) $\pi \int_1^8 (x^2 + 1)^6 dx$
- (C) $\pi \int_0^1 (x^2 + 1)^3 dx$
- (D) $\pi \int_0^1 (x^2 + 1)^6 dx$
- (E) $2\pi \int_0^1 (x^2 + 1)^6 dx$
5. Which of the following integrals correctly gives the area of the region consisting of all points above the x -axis and below the curve $y = 8 + 2x - x^2$?
- (A) $\int_{-2}^4 (x^2 - 2x - 8) dx$
- (B) $\int_{-4}^2 (8 + 2x - x^2) dx$
- (C) $\int_{-2}^4 (8 + 2x - x^2) dx$
- (D) $\int_{-4}^2 (x^2 - 2x - 8) dx$
- (E) $\int_2^4 (8 + 2x - x^2) dx$

6. A solid is generated when the region in the first quadrant bounded by the graph of $y = 1 + \sin^2 x$, the line $x = \frac{\pi}{2}$, the x -axis, and the y -axis is revolved about the x -axis. Its volume is found by evaluating which of the following integrals?

(A) $\pi \int_0^1 (1 + \sin^4 x) dx$

(B) $\pi \int_0^1 (1 + \sin^2 x)^2 dx$

(C) $\pi \int_0^{\frac{\pi}{2}} (1 + \sin^4 x) dx$

(D) $\pi \int_0^{\frac{\pi}{2}} (1 + \sin^2 x)^2 dx$

(E) $\pi \int_0^{\frac{\pi}{2}} (1 + \sin^2 x) dx$

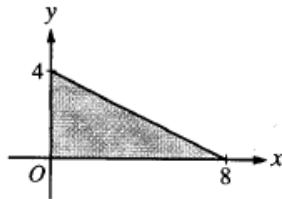
A graphing calculator may be used on the following problems.

7. The volume generated by revolving about the y -axis the region enclosed by the graphs $y = 9 - x^2$ and $y = 9 - 3x$, for $0 \leq x \leq 2$, is
- (A) -8π (B) 4π (C) 8π (D) 24π (E) 48π
8. Find the distance traveled (to three decimal places) in the first four seconds, for a particle whose velocity is given by $v(t) = 7e^{-t^2}$; where t stands for time.
- (A) 0.976 (B) 6.204 (C) 6.359 (D) 12.720 (E) 7.000

9. Find the distance traveled (to three decimal places) from $t = 1$ to $t = 5$ seconds, for a particle whose velocity is given by $v(t) = t + \ln t$.

(A) 6.000
(B) 1.609
(C) 16.047
(D) 0.800
(E) 148.413

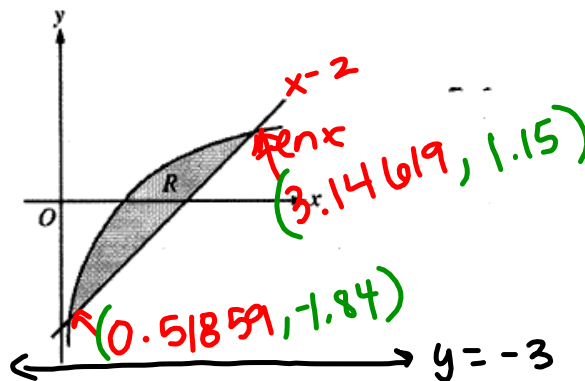
10.



- The base of a solid is a region in the first quadrant bounded by the x -axis, the y -axis, and the line $x + 2y = 8$, as shown in the figure above. If cross sections of the solid perpendicular to the x -axis are semicircles, what is the volume of the solid?

(A) 12.566 (B) 14.661 (C) 16.755 (D) 67.021 (E) 134.041

11.



Let R be the shaded region bounded by the graph of $y = \ln x$ and the line $y = x - 2$, as shown above.

- Find the area of R .
- Find the volume of the solid generated when R is rotated about the horizontal line $y = -3$.
- Write, but do not evaluate, an integral expression that can be used to find the volume of the solid generated when R is rotated about the y -axis.

$$a) A = \int_{0.51859}^{3.14619} [\ln x - (x-2)] dx = 1.75945 \approx 1.76 \text{ units}^2$$

b) washers:

outer radius

$$r = \ln x - (-3) = \ln x + 3$$

inner radius

$$r = x - 2 - (-3) = x - 2 + 3 = x + 1$$

$$V = \pi \int_{0.51859}^{3.14619} [(\ln x + 3)^2 - (x + 1)^2] dx$$

$$= \pi (10.2428) \approx 32.1788 \approx 32.2 \text{ units}^3$$

$$c) \begin{aligned} y &= \ln x \\ \rightarrow e^y &= x \\ y &= x - 2 \\ \rightarrow x &= y + 2 \end{aligned}$$

$$V = \pi \int_{-1.84}^{1.15} [(y+2) - e^y] dy$$

Homework

Unit 8 Review